A Tier 3 risk assessment is a detailed, site-specific evaluation that may be conducted when Tier 2 site-specific target levels (SSTLs) are exceeded and it is not cost-effective to remediate the site to Tier 2 SSTLs. A Tier 3 risk assessment may be performed only after receiving approval of a Tier 3 work plan from MDNR. The Tier 3 risk assessment provides the most flexibility in developing SSTLs and requires the following steps:

Step 1: Development of a Tier 3 work plan,
Step 2: Collection of additional data, if necessary,
Step 3: Development of Tier 3 SSTLs,
Step 4: Comparison of Tier 3 SSTLs with representative concentrations,
Step 5: Recommendations for the next course of action, and
Step 6: Documentation of the Tier 3 risk assessment.

Note: A Tier 3 risk assessment should focus only on the complete and potentially complete routes of exposure for which COCs exceed the Tier 2 SSTLs.

9.1 STEP 1: DEVELOPMENT OF A TIER 3 WORK PLAN

Since a Tier 3 risk assessment provides considerable flexibility to the evaluator (i.e., it allows the use of methods and models other than those presented in this guidance), MDNR will require the development and submittal of a detailed technical work plan. The technical portion of the work plan shall, at a minimum, include the following:

- An explanation of the COCs and the complete and potentially complete routes of exposure to be evaluated at Tier 3. As mentioned above, only those routes of exposure where COCs exceeded the Tier 2 SSTLs, and the specific COCs that exceeded the Tier 2 SSTLs, need to be considered in a Tier 3 risk assessment. Thus the Tier 3 investigation will generally focus on a limited set of pathways, receptors, and COCs.

- An explanation of the fate and transport models to be used for the evaluation of the complete and potentially complete routes of exposure. The entity performing the work may propose use of a model(s) different than that used to develop Tier 1 risk-based target levels (RBTLs) and Tier 2 SSTLs. At a minimum, the proposed model must be (i) peer reviewed, (ii) publicly available, (iii) have a history of use on similar projects, and (iv) be technically defensible.

- An explanation of the input parameters required to compute the Tier 3 SSTLs. These would typically include (i) chemical-specific physical properties, (ii) chemical-specific toxicological properties, (iii) site-specific or other alternate exposure factors, and (iv) media and site-specific parameters required by the selected fate and transport models. For each of these parameters, the evaluator must provide justification for using the selected value.

- An explanation of data gaps that require additional fieldwork. At Tier 3, the evaluator must provide a detailed scope of work for the collection of this data to MDNR.

9.2 STEP 2: COLLECTION OF ADDITIONAL DATA, IF NECESSARY

Upon approval of the work plan, the evaluator shall implement the approved scope of work. Any changes in the work plan made subsequent to MDNR's approval shall be brought to the attention of MDNR. Such changes must be pre-approved by MDNR and the changes documented.

9.3 STEP 3: DEVELOPMENT OF TIER 3 TARGET LEVELS

The Tier 3 risk assessment may be performed in the forward or the backward mode as explained below.

9.3.1 Forward Mode

In the forward mode, the end result of the risk assessment will be (i) the site-specific risk values (individual excess lifetime cancer risk ($IELCR_{calculated}$) for carcinogens and hazard quotient ($HQ_{calculated}$) for non-carcinogens) and (ii) the estimated COC concentrations at the nearest current or reasonably anticipated future groundwater receptor (C_{POE}). In the forward mode, risk is first estimated based on representative COC concentrations. The estimated IELCR and HQ values are then compared with the target IELCR ($1x10^{-5}$) and HQ (1). In addition, the actual or projected concentrations in the nearest drinking water well shall be compared with the maximum contaminant levels (MCLs), health advisories, or other applicable groundwater protection levels. If the calculated risk is acceptable, the entity conducting the evaluation should request that MDNR issue a no further action (NFA) letter (assuming other conditions for NFA issuance have been met).

If the calculated risk exceeds the acceptable levels, Tier 3 SSTLs can be established by using the following relationship for each COC and each route of exposure:

$$C_{target} = C_{calculated} \times \frac{1 \times 10^{-5}}{IELCR_{calculated}} \qquad (9\text{-}1)$$

$$C_{target} = C_{calculated} \times \frac{1.0}{HQ_{calculated}} \qquad (9\text{-}2)$$

where,

C_{target}	=	Tier 3 SSTLs,
$C_{calculated}$	=	Representative COC concentration used to estimate site-specific risk (obtained from sampling data),
$IELCR_{calculated}$	=	Site-specific calculated risk,
$HQ_{calculated}$	=	Site-specific calculated hazard quotient.

9.3.2 Backward Mode

Alternatively, the evaluator may calculate Tier 3 SSTLs directly using the backward mode as explained in Appendix B.

9.4 STEP 4: COMPARISON OF TIER 3 TARGET LEVELS WITH REPRESENTATIVE CONCENTRATIONS

In this step the Tier 3 SSTLs are compared with the representative concentrations (or, for surficial soil at a residential setting, the maximum COC concentrations). Note that representative concentrations used at Tier 2 may be used at Tier 3 unless additional data requires that these be modified (i.e., a new average or representative concentration must be calculated). Based on the comparison, the evaluator shall recommend the next course of action.

9.5 STEP 5: RECOMMENDATIONS FOR THE NEXT COURSE OF ACTION

Following the Tier 3 risk assessment, one of the following two alternatives is available:

Alternative 1: If the representative (or, for surficial soil in a residential setting, the maximum) concentrations for the complete exposure pathways do not exceed the Tier 3 SSTLs, or the calculated risks do not exceed the target risk levels, and the following four conditions are met, the evaluator may request that MDNR issue a NFA letter for the release. These conditions include:

Condition 1: Confirmation that the plume is stable or decreasing (see definition at Section 5.9.3). If this condition is not satisfied, the evaluator shall recommend additional monitoring and/or source removal, as appropriate, to MDNR to achieve plume stability.

Condition 2: The maximum concentration of a COC does not exceed 10 times the representative concentration of that COC. If the maximum concentration for any COC exceeds 10 times the representative concentration, MDNR will stipulate what actions, if any, must be taken.

Condition 3: If current site use is non-residential and exposure pathways are incomplete because of the non-residential use (i.e., residential use would result in additional complete pathways), or non-residential Tier 3 SSTLs are met but residential SSTLs are exceeded, future non-residential use of the site must be assured through adequate documentation. If this condition is not met, MDNR may require that an activity and use limitation (AUL) apply to the site before a NFA letter is issued.

Condition 4: Absence of ecological concerns at the site. If this condition is not met, the evaluator shall provide recommendations to MDNR to address the condition.

Alternative 2: If one or more representative concentrations exceed the Tier 3 SSTLs, or the estimated risks exceed the target risk levels, the evaluator shall propose remedial actions to MDNR in a Risk Management Plan (RMP).

9. 6 STEP 6: DOCUMENTATION OF TIER 3 RISK ASSESSMENT

Since a Tier 3 risk assessment is very site-specific, MDNR has not developed any standardized reporting forms for documenting a Tier 3 risk assessment. Rather, the entity performing the work shall submit a report clearly describing the data used, the methodology and key assumptions, the results, and recommendations regarding the path forward. Any deviation from the approved scope of work and the rationale for the deviation shall be clearly documented in the report. Refer to Section 12 of this document for further information regarding the expected content of the Tier 3 Risk Assessment Report.